



U.S. Department of Energy
Idaho Operations Office

Engineering Evaluation/Cost Analysis (EE/CA) for Decommissioning of TAN-630 and TAN-650 at the Loss-of-Fluid Test (LOFT) Area

January 2006

Idaho Cleanup Project

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**Prepared for the
U.S. Department of Energy
DOE Idaho Operations Office**

EXECUTIVE SUMMARY

The U.S. Department of Energy is proposing to decommission TAN-630, the Loss-of-Fluid Test (LOFT) Control and Equipment Building, and TAN-650, the Containment Service Building, at the LOFT area using a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) non-time-critical removal action. The scope of the proposed removal action is limited to TAN-630 and TAN-650. This Engineering Evaluation/Cost Analysis (EE/CA) has been prepared to assist the U.S. Department of Energy Idaho Operations Office in identifying the most effective method for performing the decommissioning of these two structures whose missions ended in 1986. The two structures are located at Test Area North (TAN) within the Idaho National Laboratory (INL) site. The non-time-critical removal action approach satisfies environmental review requirements and provides for stakeholder involvement, while providing a framework for selection of the decommissioning end states. The non-time-critical removal action approach also establishes an Administrative Record for documentation of the implemented action.

This Engineering Evaluation/Cost Analysis has been developed in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act as amended by the Superfund Amendments and Reauthorization Act of 1986 and in accordance with the National Oil and Hazardous Substances Pollution Contingency Plan (40 CFR Part 300). This non-time-critical removal action is consistent with the remedial action objectives of the *Final Record of Decision, Test Area North, Operable Unit 1-10* (DOE/ID-10682) (ROD) and supports the overall remediation goals established through the Federal Facility Agreement and Consent Order for Waste Area Group (WAG) 1. WAG 1 is located at TAN. The decommissioning action will place TAN-630 and TAN-650 in final configurations that remain protective of human health and the environment. Preparation of this EE/CA is consistent with the joint U.S. Department of Energy (DOE) and U.S. Environmental Protection Agency (EPA) *Policy on Decommissioning of Department of Energy Facilities Under the Comprehensive Environmental Response, Compensation, and Liability Act* (DOE and EPA 1995), which establishes the CERCLA non-time-critical removal action process as an approach for decommissioning.

DOE has developed three alternatives for determining how to appropriately complete decommissioning activities. The alternatives are summarized as follows:

- Actions associated with Alternative 1 consist of the removal of above ground structures and components associated with TAN-630 and TAN-650, the removal of below ground components associated with TAN-630 and TAN-650, the removal of structural walls associated with TAN-630 and TAN-650 to three feet below grade, removal of radiological contamination, and filling the void to grade with solid inert material.

- Actions associated with Alternative 2 consist of the removal of above ground structures and components associated with TAN-630 and TAN-650, the removal of below ground components with the exception of the TAN-650 lower containment system, filling the upper and lower containment building sumps with solid inert material, capping appropriate pipe penetrations, filling the lower containment building proper with solid inert material, and the construction of a long-term viable cover overlaying the TAN-650 upper and lower containment building.
- Under the Alternative 3 scenario, there will be no physical alteration of TAN-630 and TAN-650. Actions associated with Alternative 3 consist predominantly of continued surveillance and maintenance.

Alternative 2 is the recommended alternative, because it meets the proposed removal action objectives regarding long-term risk, minimization of short-term worker risk and radiation exposure, is cost effective, and provides a safe and stable configuration that is environmentally sound. Under this alternative, demolition debris would be disposed of at the TAN Demolition Landfill, the INEEL CERCLA Disposal Facility (ICDF), or other INL site or non-INL disposal facility.

This Engineering Evaluation/Cost Analysis will become part of the INL Administrative Record. It will be made available for public comment. The INL Administrative Record is on the Internet at <http://ar.inel.gov/> and is available to the public at the following locations:

Albertsons Library
Boise State University
1910 University Drive
Boise, ID 83725
(208) 426-1625

INEEL Technical Library
DOE Public Reading Room
1776 Science Center Drive
Idaho Falls, ID 83415
(208) 526-1185

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ACRONYMS

ACHP	Advisory Council on Historic Preservation
Ag	Silver
ANPP	Aircraft Nuclear Propulsion Program
ALARA	As Low As Reasonably Achievable
ARARs	Applicable or Relevant and Appropriate Requirements
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
Ci	Curie
cm	centimeters
Co	Cobalt
CRMP	Cultural Resources Management Plan
Cs	Cesium
CTF	Contained Test Facility
D&D	Decommissioning and Demolition
DEQ	Idaho Department of Environmental Quality
DOE-ID	U.S. Department of Energy Idaho Operations Office
dpm	disintegrations per minute
EBSL	Ecological Based Screening Levels
EE/CA	Engineering Evaluation/Cost Analysis
EPA	U.S. Environmental Protection Agency
ESDs	Explanation of Significant Differences
Eu	Europium
FET	Flight Engine Test
g	gram
H	Hydrogen
HWMA	Hazardous Waste Management Act
ICDF	INEEL CERCLA Disposal Facility
IDAPA	Idaho Administrative Procedures Act
INEEL	Idaho National Engineering and Environmental Laboratory

INL	Idaho National Laboratory
Kg	kilogram
L	liter
LCRE	Lithium Cooled Reactor Experiment
LOFT	Loss-of-Fluid Test
m	meter
mg	milligram
NESHAPS	National Emissions Standards for Hazardous Air Pollutants
NHPA	National Historic Preservation Act of 1966
NMSWLF	Non-Municipal Solid Waste Landfill
OSHA	Occupational Safety and Health Administration
OU	Operable Unit
pCi	picocurie
ppm	parts per million
RCRA	Resource Conservation Recovery Act
ROD	Record of Decision
Sb	Antimony
SHPO	Idaho State Historic Preservation Officer
SMC	Specific Manufacturing Capabilities
Sr	Strontium
TAN	Test Area North
TBC	to be considered
TSCA	Toxic Substances Control Act
TSF	Technical Support Facility
VCO	Voluntary Consent Order
WRRTF	Water Reactor Research Test Facility
yr	year
Zn	Zinc

Engineering Evaluation/Cost Analysis for the Decommissioning of TAN-630 and TAN-650 at the Loss-of-Fluid Test (LOFT) Area

1. INTRODUCTION

This Engineering Evaluation/Cost Analysis has been developed in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) as amended by the Superfund Amendments and Reauthorization Act of 1986 and in accordance with the National Oil and Hazardous Substances Pollution Contingency Plan (40 CFR Part 300). This Engineering Evaluation/Cost Analysis assists the U.S. Department of Energy Idaho Operations Office (DOE-ID) in identifying the preferred decommissioning alternative for TAN-630, the Loss-of-Fluid Test (LOFT) Control and Equipment Building, and TAN-650, the Containment Service Building, at the LOFT area. It is intended to satisfy environmental review requirements for the removal action, provide a framework for evaluating and selecting alternative decommissioning approaches, and satisfy Administrative Record requirements for documentation of the implemented action. This Engineering Evaluation/Cost Analysis (EE/CA) identifies the objectives of the action and analyzes the effectiveness, implementability, and cost of various decommissioning alternatives that could satisfy these objectives.

DOE-ID proposes to decommission TAN-630 and TAN-650 at LOFT. LOFT is located at Test Area North (TAN) within the Idaho National Laboratory (INL) site. TAN-630 and TAN-650 are undergoing deactivation and have been placed in a “dark, cold and dry condition”. This EE/CA was prepared to conduct a non-time-critical removal action under CERCLA that addresses the decommissioning of TAN-630 and TAN-650.

TAN-630, commonly referred to as the Control Building, and TAN-650, commonly referred to as the Containment Building, were deactivated in 1986 and have not been productively used since that time. Deactivation included the removal of the reactor core, cleanup, and plant shutdown. The deactivation phase has been completed. Hazardous waste was removed through the Voluntary Consent Order (VCO) process, which constitutes an enforceable agreement with the State of Idaho for addressing RCRA compliance issues. DOE will issue an action memorandum to document alternative selection and decommissioning activities will commence in accordance with the approach specified in the selected alternative. The end result of these efforts is that TAN-630 and TAN-650 will be placed in a configuration that is protective of human health and the environment. The removal action will be consistent with the joint U.S. Department of Energy (DOE) and U.S. Environmental Protection Agency (EPA) *Policy on Decommissioning of Department of Energy Facilities Under the Comprehensive Environmental Response, Compensation and Liability Act* (DOE and EPA 1995), which permits usage of the CERCLA non-time critical removal action process as an approach for decommissioning.

DOE has developed three alternatives for determining how to appropriately complete decommissioning activities. The alternatives are summarized as follows:

- Actions associated with Alternative 1 consist of the removal of above ground structures and components associated with TAN-630 and TAN-650, the removal of below ground components associated with TAN-630 and TAN-650, the removal of structural walls associated with TAN-630 and TAN-650 to three feet below grade, and filling the void to grade with solid inert material.

- Actions associated with Alternative 2 consist of the removal of above ground structures and components associated with TAN-630 and TAN-650, the removal of structural walls associated with TAN-630 and TAN-650 to three feet below grade, the removal of below ground components with the exception of the TAN-650 lower containment sump system, filling the upper and lower containment building sumps with solid inert material, capping appropriate pipe penetrations, filling the lower containment building proper with solid inert material, and the construction of a long-term viable cover overlaying the TAN-650 lower containment building.
- Under the Alternative 3 scenario, there will be no physical alteration of TAN-630 and TAN-650. Actions associated with Alternative 3 consist predominantly of continued surveillance and maintenance.

The three alternatives are discussed in greater detail in Section 4.

2. SITE CHARACTERIZATION

This section provides a brief summation of available data with respect to TAN-630 and TAN-650. In particular, the site characterization section addresses the following: site description and background of the INL site, TAN-630, and TAN-650; previous and ongoing closure and cleanup actions at TAN-630 and TAN-650; deactivation activities at TAN-630 and TAN-650 that are currently underway; a summary of the radiological and nonradiological characterization of TAN-630 and TAN-650; and the streamlined risk assessment associated with the alternatives.

2.1 Site Description and Background

2.1.1 Idaho National Laboratory Site

The INL site is an 890-square-mile DOE facility located on the Eastern Snake River Plain in southeastern Idaho. DOE controls the land within the INL site, and public access is restricted to public highways, DOE-sponsored tours, special-use permits, and the Experimental Breeder Reactor-I National Historic Landmark. DOE also accommodates Shoshone-Bannock tribal member access to specific areas on the INL site for cultural and religious purposes.

The INL site consists of several facility areas situated on an expanse of otherwise undeveloped, cool-desert terrain. Buildings and structures at the INL site are clustered within those facility areas, which are typically less than a square mile in size and separated from each other by miles of primarily undeveloped land. TAN is located at the north end of the INL site about 27 miles northeast of the Central Facilities Area (see Figure 1).

Population centers in the region include large towns (>10,000 residents) such as Idaho Falls, Pocatello, Rexburg, and Blackfoot which are located several miles to the east and south, and several smaller towns (<10,000) located around the site such as Arco, Howe, and Atomic City. Yellowstone and Grand Teton National Parks and Jackson Hole, Wyoming are located less than 60 miles to the northeast. No permanent residents reside on the INL site.

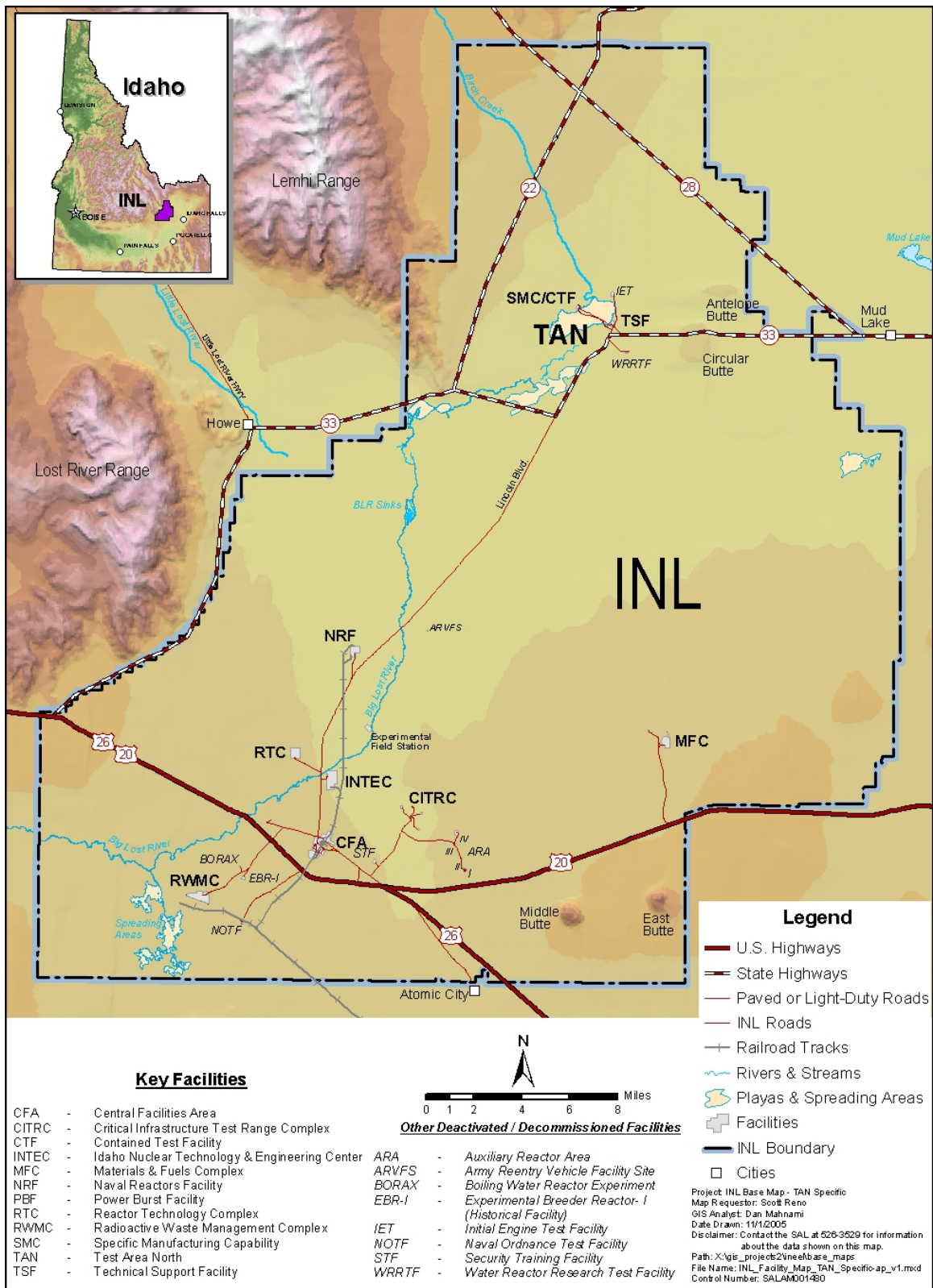


Figure 1. Idaho National Laboratory.

2.1.2 Test Area North Area, Specifically TAN-630 and TAN-650

TAN was established in the 1950s by the U.S. Air Force for the Atomic Energy Commission Aircraft Nuclear Propulsion Program (ANPP) to support nuclear-powered aircraft research. Upon termination of this research, TAN structures were redirected to support a variety of DOE research projects.

TAN-630, the LOFT Control building, was constructed in 1959 as an integral part of the Flight Engine Test (FET) facility. The FET mission was to prove the feasibility of nuclear powered flight and the TAN-630 structure was constructed to house remote control, measuring, and data analysis associated with the nuclear airplane. The ANPP was cancelled in 1961 before the airplane was built and TAN-630 was never used for its originally intended purpose. After cancellation of the ANPP, TAN-630 and a hangar constructed to house the aircraft were designated for use by a nuclear space program known as the Lithium Cooled Reactor Experiment (LCRE). TAN-630 and the hangar were reconfigured to accommodate the experiments, but the LCRE was cancelled before any actual tests were conducted.

In the late 1970s, TAN-630 and various ANPP/LCRE structures were put back into service in support of reactor loss-of-fluid testing. In 1972, other structures were completed including a containment building, TAN-650, that housed the pressurized water reactor and its related components (Figure 2). The experiments were originally intended to simulate large break loss-of-coolant-accidents. The experiments and equipment were subsequently reconfigured to simulate small break accidents like the one that occurred in 1978 at the Three Mile Island Nuclear Power Plant in Pennsylvania. To demonstrate its ability to achieve shutdown in a runaway situation, the reactor core was intentionally destroyed in the mid-1980s. From 1975 through July 1985, a total of 44 significant experiments were conducted at LOFT. In 1986 at the conclusion of the LOFT project, the decontamination and inactivation effort resulted in the removal of the reactor and other radioactive components from the containment building, decontamination and clean-up, and plant shutdown. TAN-630 and TAN-650 have been in a deactivated condition since that time.

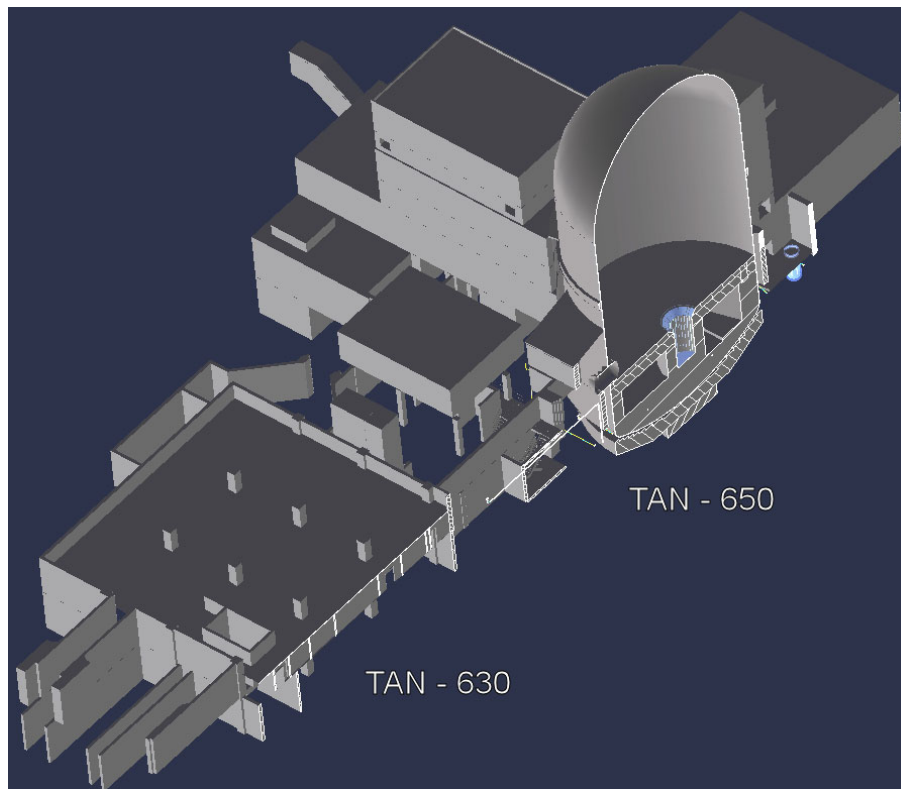
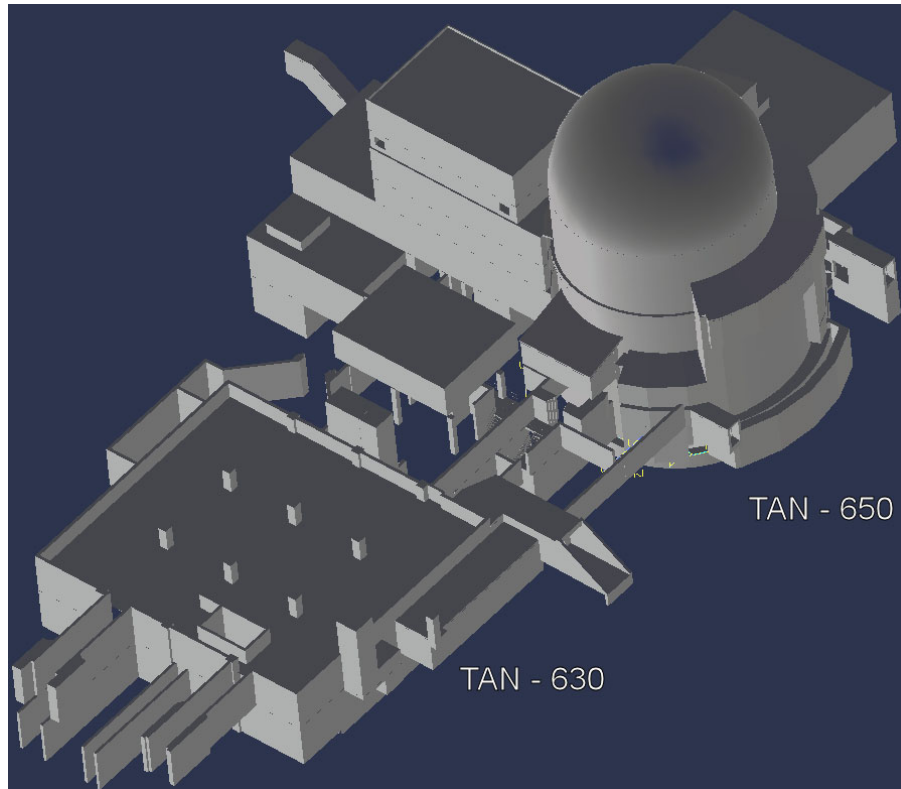


Figure 2. LOFT Area. Isometric views of upper and lower containment dome.

2.2 Previous Closure/Cleanup Activities at TAN-630 and TAN-650

Recent CERCLA activities at TAN have been focused predominantly at the Technical Support Facility (TSF) area, which is approximately 1-mile due east of the LOFT area. Over the last two years, many buildings and structures have been decommissioned and demolished at the TSF (e.g., TAN-615, TAN-616, etc.) and at LOFT (e.g., TAN-726, TAN-725, etc.).

2.2.1 CERCLA Activities

CERCLA remedial actions have occurred or will occur at eight sites in accordance with the *Final Record of Decision, Test Area North, Operable Unit 1-10* (DOE/ID-10682) (ROD). These CERCLA remedial actions are grouped into the following six remedial action groups:

- V-Tanks (TSF-09 and TSF-18) - This action should be completed during the summer of 2006.
- PM-2A Tanks (TSF-26) – This action was completed during the summer of 2005.
- Soil Contamination Area South of the Turntable (TSF-06, Area B) – This action was completed during the summer of 2004.
- Disposal Pond (TSF-07) – This action is on-hold as long as TAN-607 is operational.
- Burn Pits (TSF-03 and WRRTF-01) – This action was completed during the summer and fall of 2004.
- Fuel Leak (WRRTF-13) – This action was completed during the summer of 2004.

Some sites have completed remediation (e.g., the PM-2A Tanks, Burn Pits, etc.) while other sites are under institutional controls (e.g., the Disposal Pond). The V-Tanks are currently undergoing remediation. For two sites, the TSF Injection Well (TSF-05) and the Contaminated Ground Water Beneath TSF (TSF-23), the CERCLA remedial action is addressed by the Operable Unit 1-07B Record of Decision. The remedy will reduce potential risk to human health by reducing groundwater contamination and preventing the ingestion of contaminated groundwater by potential future residents at the site.

2.2.2 Voluntary Consent Order Activities

Eighteen tank systems comprising 79 tanks located in TAN-630 and TAN-650 at the LOFT area were identified as covered matters in the SITE-TANK-005 Action Plan of the Voluntary Consent Order (VCO), an enforceable agreement with the IDEQ that addressed several RCRA compliance issues. RCRA actions have been completed for these tanks. Seventeen of the tank systems (75 tanks) were characterized as RCRA non-hazardous or empty. One tank system was characterized as hazardous and the RCRA closure of this VCO Tank System TAN-020 was completed in 2005. This closure was completed in accordance with the *HWMA/RCRA Closure Plan Addressing the HTRE-3 Mercury Spill at TAN/CTF (LOFT)* (DOE/ID-11097, December 2004, Rev 4).

Closure activities addressed units and ancillary equipment within the containment building that were contaminated by HWMA/RCRA hazardous constituents during decontamination and decommissioning of the Heat Transfer Reactor Experiment Number 3 (HTRE-3) test engine. Closure activities also addressed ancillary equipment that transferred chromated wastewater from the mobile test assembly shield tank during facility deactivation. Piping and sumps were decontaminated for mercury as part of the closure activities and in the process radiological contamination was reduced through the removal of sludge and sediment in the sumps and piping. Closure activities, which were completed in April 2005, are summarized below.

- Residual waste removal - Residual solids in the pressure reduction and decontamination sump, high level radioactive waste sump, filter sump, and condensate sump were removed. Liquid contained within piping was drained. Solids present in the system piping in excess of the criteria specified in the closure plan were removed and disposed off-site.
- Piping and ancillary equipment removal - Most piping and ancillary equipment were removed in lieu of decontamination and disposed off-site.
- Decontamination of system components - In cases where removal was not feasible, such as sumps, drains, and portions of lines embedded in concrete, system components were decontaminated by removing the accumulated debris and following-up with pressure washing. Primary system components that were decontaminated included: the filter sump and a portion of the upper containment building floor and peripheral trench that drained to the sump; the condensate sump and the portion of the upper containment building floor that drained to the sump; the pressure reduction and decontamination sump and associated embedded piping; and the high level waste sump and its associated piping. Rinsate generated during the decontamination process was disposed off-site.
- Decontamination of secondary containment structures - Inspections of the test chamber concrete floor indicated that the epoxy-paint liner had been damaged and bare concrete exposed. These damaged areas were decontaminated by using a physical extraction technology (e.g., scabbling and shaving). Waste-related residues were present on portions of the floor, walls, and ceiling in the southeast quadrant of the containment building basement. Areas with visible waste-related residues and the entire floor were decontaminated using a physical extraction technology (e.g., scabbling, grit blasting, and shaving).

On May 5, 2005, DOE-ID submitted the signed Owner/Operator Certification and the Professional Engineer's closure certification report and supporting documentation to the DEQ documenting completion of the RCRA closure. On July 21, 2005 DEQ transmitted correspondence acknowledging completion of activities specified in the approved closure plan.

2.3 Current Closure/Cleanup Activities at TAN-630 and TAN-650

The CERCLA site LOFT-02, the LOFT Disposal Pond (north of TAN-650), exhibits an ecological risk above threshold levels, but not an unacceptable risk to human health. This site will be further evaluated in the site-wide ecological risk assessment.

During 2004 and 2005, major system components at TAN-630 AND TAN-650 were either removed or decontaminated. RCRA regulated components (e.g., silver and lead found in the contact points of high voltage breakers, lead contaminated brass and bronze in the form of sprinkler heads and valves) in TAN-630 and TAN-650 were removed and managed in accordance with federal, state, and local regulations and disposed off-site. During that timeframe, asbestos abatement was also performed in both TAN-630 and TAN-650.

2.4 Extent of Contamination and Remaining Inventories

2.4.1 Remaining Radionuclide Inventory

Upper surfaces of the interior walls of the upper containment building dome, the circular crane system, and the ventilation ducting along the east side of the containment dome have fixed radioactive contamination. These contaminated surfaces would be difficult to decontaminate due to the height above the floor of the containment dome. Fixed radioactive contamination remains in the sumps and associated embedded piping in the TAN-650 lower containment. The borated water storage tank, a 42,000 gallon radiologically contaminated tank, is located on the top floor of the TAN-650 tower. Basement sumps and piping drains, excluding the containment building, were grouted in place during 2005 to prevent water infiltration from the undefined perched layer. The sumps had been previously RCRA closed. Minor amounts of radiological contamination also exist in some areas of TAN-650 from overflows of sumps or minor spills or releases. The remaining radionuclide inventory will be managed in accordance with the actions specified in the selected alternative, whether that be Alternative 1, Alternative 2, or Alternative 3.

The largest radiological source term is in the contaminated sumps and associated piping remaining in TAN-650. A profile drawing of the sumps and associated embedded piping for the TAN-650 containment area are illustrated in Figure 3 and Figure 4. Minor amounts of radiological contamination from overflows or minor spills or releases in TAN-650 do not significantly contribute to the radiological source term that will remain. Therefore, to ensure the remaining radiological inventory is bounded, conservative estimates from the sumps and associated piping in TAN-650 were used. The radionuclide inventories for the piping were determined using analyses illustrated in EDF-6355 and embedded piping data summaries and sump area summaries provided by LOFT engineering staff. The following assumptions were used in the development of the radionuclide inventory:

- Contaminants are dispersed inside horizontal piping along the lower 50% of the length.
- Contaminants are dispersed inside vertical piping along the lower 50% of the length for conservatism. Vertical piping is less contaminated than horizontal piping due to the physics of fluids, gravity, and the plating out effect of settling contamination (EDF-6355).
- The highest removable contamination level (i.e., 13,000,000 dpm/100 cm²) for horizontal high level waste sump piping was assigned to the TAN-650 piping, as a conservative estimate (Figure 4). (Note: The high level waste sump did not hold irradiated fuel as implied by the name itself. Piping and sumps were decontaminated for mercury as part of the RCRA closure activities and in the process radiological contamination was reduced through the removal of sludge and sediment in the sumps and piping.)
- The radionuclide inventories were decayed for 90 years to account for the piping and concrete foundation remaining structurally stable during the time through 2095 that DOE is anticipated to maintain control of the facility.

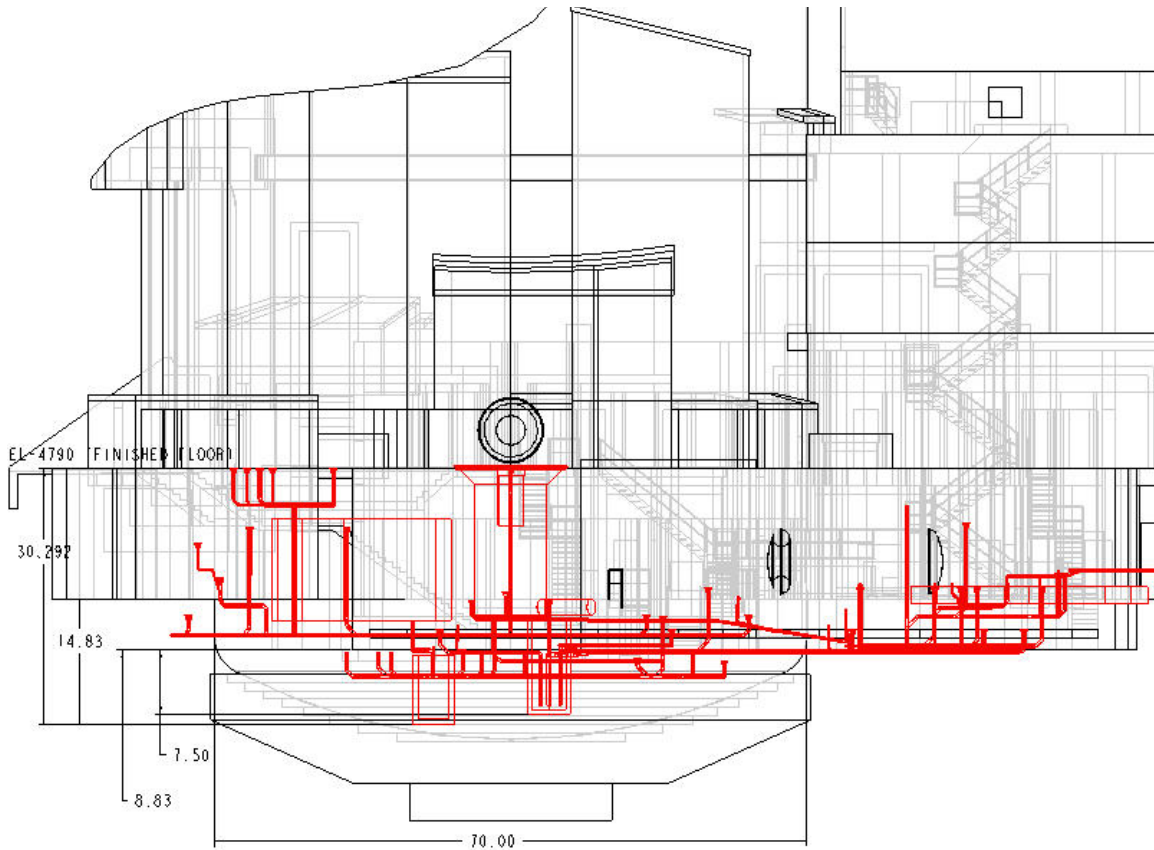


Figure 3. TAN-650 cross-section illustrating sumps and embedded piping.

A total contaminated surface area for the embedded piping (i.e., bottom half of the piping) was determined to be $5.4 \times 10^5 \text{ cm}^2$, approximately 63 square feet. The radionuclide inventories for the sumps were also determined using the highest removable contamination level (i.e., 13,000,000 dpm/100 cm^2) for high level waste sump piping, which is a conservative estimate based on process knowledge of the system and knowing that activities are not expected to be higher since the high level waste sump piping would have been exposed to the highest radiological contamination. A total contaminated surface area for the sumps was determined to be $2.07 \times 10^6 \text{ cm}^2$, approximately 2,228 square feet. The radionuclide inventory for Year 2005 is shown in Table 1. Currently it is assumed that there will be no additional increase of radiation exposure above background to the worker or member of the public once the actions specified in the selected alternative are implemented. The radionuclide inventory for Year 2095 is shown in Table 2. The total activity for 2005 is 0.155 curies. The total activity for 2095 is 0.018 curies.

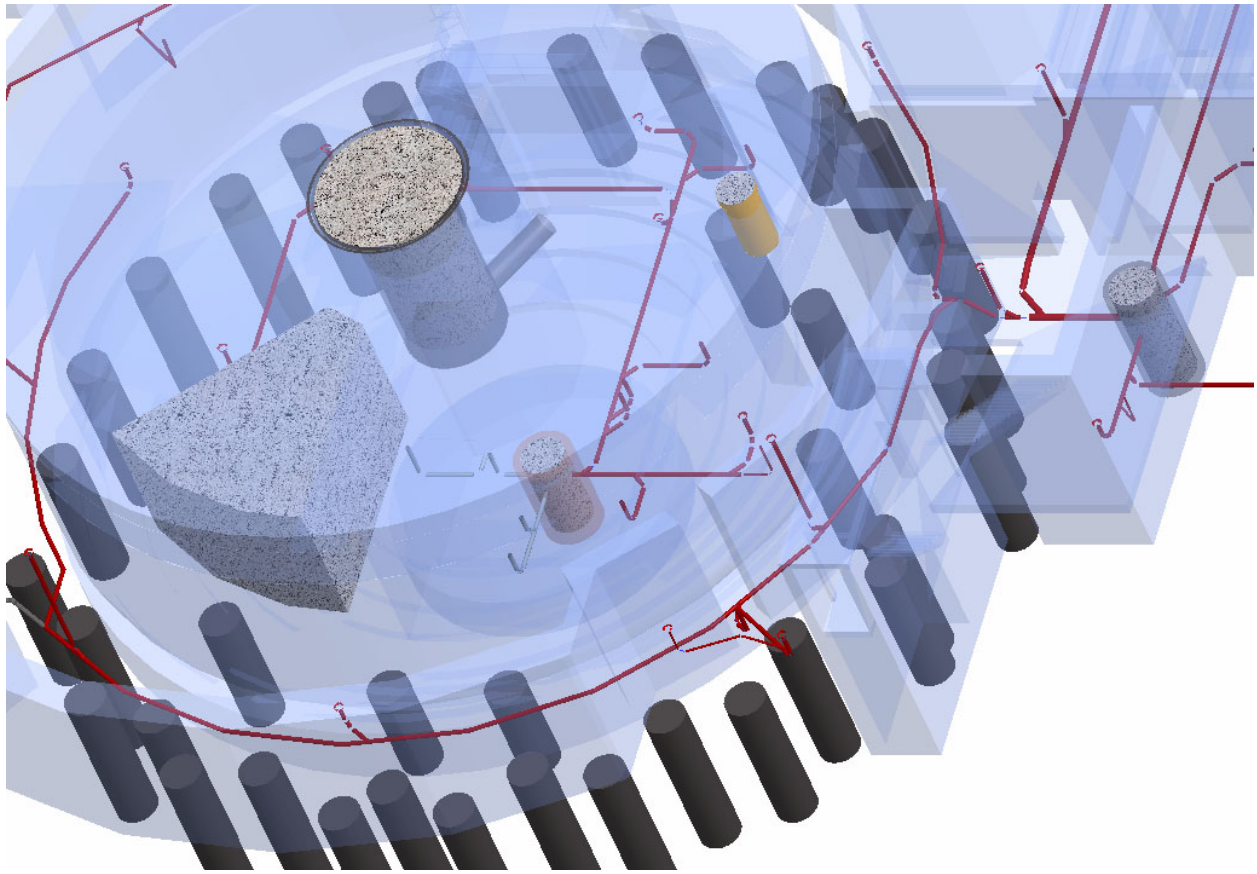


Figure 4. Isometric view of TAN-650 containment sumps and piping.

Table 1. TAN-650 Year 2005 Radionuclide Piping and Sump Inventories.

Nuclide	Half-Life (yr)	% Abundant	Piping 2005 Activity (Ci)	Sumps 2005 Activity (Ci)	Total 2005 Activity (Ci)
Ag-108m	130	0.0010	3.42E-07	1.21E-06	1.55E-06
Co-60	5.27	9.0000	3.08E-03	1.09E-02	1.40E-02
Cs-134	2.06	0.0043	1.47E-06	5.21E-06	6.68E-06
Cs-137 ^a	30.07	87.0000	2.98E-02	1.05E-01	1.35E-01
Eu-152	13.54	0.0100	3.42E-06	1.21E-05	1.55E-05
Eu-155	4.75	0.0066	2.26E-06	8.00E-06	1.03E-05
H-3	12.32	0.0062	2.12E-06	7.52E-06	9.64E-06
Sb-125	2.76	0.0900	3.08E-05	1.09E-04	1.40E-04
Sr-90 ^a	28.78	3.7600	1.29E-03	4.56E-03	5.84E-03
Zn-65	0.6675	0.1190	4.07E-05	1.44E-04	1.85E-04
Total					0.155
a. Activities do not include progeny (i.e., Ba-137m and Y-90).					

Table 2. TAN-650 Year 2005 Radionuclide Piping and Sump Inventories.

Nuclide	Half-Life (yr)	% Abundant	Piping 2005 Activity (Ci)	Sumps 2005 Activity (Ci)	Total 2005 Activity (Ci)
Ag-108m	130	0.0010	2.12E-07	7.50E-07	9.62E-07
Co-60	5.27	9.0000	2.23E-08	7.91E-08	1.01E-07
Cs-134	2.06	0.0043	1.04E-19	3.70E-19	4.74E-19
Cs-137 ^a	30.07	87.0000	3.74E-03	1.33E-02	1.70E-02
Eu-152	13.54	0.0100	3.42E-08	1.21E-07	1.55E-07
Eu-155	4.75	0.0066	4.48E-12	1.59E-11	2.03E-11
H-3	12.32	0.0062	1.34E-08	4.76E-08	6.10E-08
Sb-125	2.76	0.0900	4.72E-15	1.67E-14	2.15E-14
Sr-90 ^a	28.78	3.7600	1.47E-04	5.22E-04	6.69E-04
Zn-65	0.6675	0.1190	1.07E-45	3.80E-45	4.87E-45
Total					0.018
a. Activities do not include progeny (i.e., Ba-137m and Y-90).					

2.4.2 Remaining Nonradionuclide Inventory

Deactivation activities (e.g., removal of diesel fuel lines, electrical conduit, etc.) are nearing completion in TAN-630. Oversized remaining units and equipment (e.g., industrial-sized boilers, duct work, etc.) will be removed and disposed of during decommissioning. Minor asbestos removal activities are currently on-going in TAN-630 and TAN-650 and will be completed prior to decommissioning. The painted surfaces that could potentially contain PCBs over 50 ppm will be removed and sent to the TAN Demolition Landfill, this being in accordance with 40 CFR 761.62(b)(1). The TAN-630 control room equipment will be removed and properly disposed of in accordance with the schedule.

2.5 Streamlined Risk Assessment

A worst case risk assumption from radiological contamination was evaluated by considering an upper bound contaminant source term and exposure scenario (Alternative 2). The source term for the risk assessment was estimated by assuming the piping, sumps, and drains beneath TAN-650 are filled with liquids and sludge contaminated to the same degree as the material assumed to remain in the High Level Waste Sump Piping and Drains. These sumps, embedded pipes, and drains are assumed to contain the worst contamination that might be left in place after the proposed removal action is complete. The lines and sumps being evaluated were rinsed and flushed of all liquids and sediment under a previous RCRA closure (Figure 4). The source term calculations are based on sampling data collected prior to the RCRA closure. For risk calculation purposes, we are assuming water and sediment are still present in the lines and sumps. This will give the risk assessment a worst case scenario. In addition, we used a residential scenario that assumes a chronic exposure that should also bound the risk. Although the driller scenario, may provide a higher acute exposure, it would not be expected to exceed the risk from the more chronic residential scenario used.

A review of the OU 1-10 BRA indicates that for LOFT-02 three contaminants were identified as a concern for ecological receptors. These three are copper, fluoride, and manganese which had hazard indices over 20 for ecological receptors based on the screening assessment performed. Since the 1997 timeframe EPA has provided additional guidance for performing ecological risk assessments which has been used to update the INL approach. Using this new information, these three contaminants were re-evaluated for risk to ecological receptors.

Copper was eliminated as a concern since the maximum concentration detected (33 mg/kg) is below the newer EBSL (40 mg/kg). The maximum detected concentration of both fluoride and manganese still exceed available screening values and background. The OU 10-04 Work Plan (DOE-ID 1999) documents the reevaluation of toxicity values, individual receptors and uptake factors for these contaminants. These new values were used to reassess both fluoride and manganese. Fluoride has hazard quotients less than 10 and can be eliminated. Based on the assessment of the maximum value of manganese, this contaminant may be of concern. However, manganese is an essential nutrient for animals that is toxic at higher concentrations. In general, adverse health effects have not occurred in most species with dietary concentrations of 1,000 ppm manganese or less (Mineral Tolerance of Domestic Animals 1984). Also, data gathered as part of the OU 10-04 Long-term Ecological Monitoring Project indicates that manganese is not moving through the food web as conservatively modeled in the assessment. More importantly, EPA is currently reviewing this contaminant for the development of an ECO-SSL. This should be used to verify the assumption that manganese is not a problem at this site when this EPA document becomes available.

Table 3 presents the radionuclide activities, concentrations, and ecological screening levels used in the assessment. Nonradionuclide contamination is expected to be removed and was not considered in the risk assessment. Ecological risks were also not evaluated in the assessment since the estimated soil concentrations after 90 years of decay are significantly less than the INL site ecological screening levels for the evaluated contaminants as shown in Table 3.

Table 3. Contaminant Source Terms Used in the TAN-630 and TAN-650 Risk Assessment.

Radionuclide	Current Assumed Activity pCi (Ci)	Activity Remaining in 2095 pCi (Ci)	Soil Concentration Remaining in 2095 ^a pCi(Ci/g)	Peak Groundwater Concentration ^b pCi (Ci/L)	Ecological Based Screening Level ^c pCi (Ci/g)
Ag-108	1.55E 06 (1.55E-06)	9.62E 05 (9.62E-07)	6.06E-05 (6.06E-17)	0.0E+00 (0.0E+00)	1.82E 03 (1.82E-09)
Co-60	1.40E 10 (1.40E-02)	1.01E 05 (1.01E-07)	6.36E-06 (6.36E-18)	0.0E+00 (0.0E+00)	1.18E 03 (1.18E-09)
Cs-134	6.68E 06 (6.68E-06)	4.74E-07 (4.74E-19)	2.99E-17 (2.99E-29)	0.0E+00 (0.0E+00)	1.90E 03 (1.90E-09)
Cs-137	1.35E-11 (1.35E-01)	1.70E 10 (1.70E-02)	1.07E+00 (1.07E-12)	0.0E+00 (0.0E+00)	4.95E 03 (4.95E-09)
Eu-152	1.55E 07 (1.55E-05)	1.55E 05 (1.55E-07)	9.75E-06 (9.76E-18)	0.0E+00 (0.0E+00)	2.18E 03 (2.18E-09)
Eu-155	1.03E 07 (1.03E-05)	2.03E 01 (2.03E-11)	1.28E-09 (1.28E-21)	0.0E+00 (0.0E+00)	3.25E 04 (3.25E-08)
H-3	9.65E 07 (9.65E-05)	6.10E 04 (6.10E-08)	3.84E-06 (3.84E-18)	2.0E-04 (2.0E-16)	3.4E 05 (3.43E-07)
Sb-125	1.40E 08 (1.40E-04)	2.15E-02 (2.15E-14)	1.35E-12 (1.35E-24)	0.0E+00 (0.0E+00)	6.02E 03 (6.02E-09)
Sr-90	5.84E 09 (5.84E-03)	6.69E 08 (6.69E-04)	4.21E-02 (4.21E-14)	0.0E+00 (0.0E+00)	3.34E 03 (3.34E-09)
Zn-65	1.85E 08 (1.85E-04)	4.87E-33 (4.87E-45)	3.07E-43 (3.07E-55)	0.0E+00 (0.0E+00)	5.21E 03 (5.21E-09)
<p>a. Soil Concentration = Remaining Activity × LOFT Surface Area × 10 ft Depth × Soil Density = Remaining Activity x 85 m × 41.5 m × 3 m × 1.5E6 g/m³</p> <p>b. Radionuclides except H-3 are predicted to completely decay prior to reaching the water table.</p> <p>c. Values taken from Table A-6 of INEEL/EXT-03-00540 (VanHorn, R. and Stacey, S., 2004, <i>Risk-Based Screening and Assessment Approach for Waste Area Group 1 Soils (Draft)</i>, INEEL/EXT-03-00540 Revision A, February 2004). Value shown is the higher of the EPA Region 4 soil screening level or the INEEL EBSL (columns 3 and 4 of Table A-6).</p>					

The exposure scenario used in the assessment assumes someone will build a house at the site of the removal action in the year 2095, 10 feet of contaminated material will be excavated while building a basement, and the material will be spread across the surface of the housing site. Finally, the scenario assumes a person will live at the site for 30 years, including 6 years of childhood, while being exposed to contamination through soil ingestion, fugitive dust inhalation, external radiation exposure, ingestion of contaminated fruits and vegetables grown around the house, and ingestion of contaminated groundwater. These assumptions are consistent with the INL Track 2 Guidance Manual (DOE/ID, 1994, *Track 2 Sites: Guidance for Assessing Low Probability Hazard Sites at the INEL*, DOE/ID-10389, Revision 6).—Groundwater concentrations used in the assessment were estimated using the GWSCREEN modeling code. The modeling predicts that the radionuclides, except tritium (H-3), were found to decay during transport before reaching the aquifer. Only tritium, which the model predicted, would not decay away during transport prior to reaching the aquifer. However, the concentration of tritium that reaches the aquifer would be well below the National Primary Drinking Water Standards as set forth by EPA. The peak groundwater concentrations estimated by the modeling are shown in Table 3.—Toxicity values for the radionuclides considered in the assessment were taken from the Environmental Protection Agency's (EPA) Health Effects Assessment Summary Tables (HEAST).—The risk assessment results (see Table 4) indicate none of the modeled contaminants will produce estimated risks to a future hypothetical residential receptor greater than 1E-04 (i.e., the upper bound of the EPA acceptable risk range). As evidenced in Table 4, the estimated risk posed by each of the isotopes is significantly less than 1E-04, otherwise referred to as 1×10^{-4} . These results indicate the long-term effectiveness of each of the three removal actions will be acceptable.

Table 4. Estimated Risk Results.

Isotope	Estimated Risk (unitless)
Ag-108m	2.E-09
Co-60	5.E-15
Cs-134	1.E-34
Cs-137+D	3.E-06
Eu-152	5.E-12
Eu-155	3.E-21
H-3	3.E-15
Sb-125+D	3.E-27
Sr-90+D	3.E-08
Zn-65	8.E-48

3. IDENTIFICATION OF REMOVAL OBJECTIVES AND SCOPE

3.1 Removal Action Objectives

The removal action objective for this non-time critical removal action is as follows: Reduce risk from external radiation exposure from Cs-137 to a total excess cancer risk of less than 1 in 10,000 for a hypothetical resident 100 years in the future from the year 1995 and the current and future worker. Per the ROD, the LOFT area will be under the control of the government until 2095. In addition, general CERCLA protectiveness standards at INL site seek to prevent future releases to the Snake River Plain Aquifer that would result in migration of contaminants to the aquifer such that drinking water maximum contaminant levels may be exceeded and to ensure cumulative excess cancer risks from multiple contaminants of concern remain less than 1 in 10,000 for a hypothetical resident 100 years in the future from the year 1995.

The removal action objective is consistent with the remedial action objectives of the ROD. The removal action objective is predicated on the current and future land uses established for the TAN area in the ROD, which includes industrial land use until at least 2095 and possible residential land use thereafter. If any newly identified release sites are discovered during implementation of the selected alternative, DOE-ID will consult with DEQ and EPA regarding potential inclusion of the newly identified release site for evaluation under the FFA/CO or whether to address the newly identified release site under other regulatory programs.

4. IDENTIFICATION OF REMOVAL ACTION ALTERNATIVES

Three alternatives, including a no action alternative, were identified for this removal action. Regardless of the alternative chosen, the SMC facility will be isolated from the LOFT facility. A concrete structure (block, pour, etc.) will be installed at the isolation point between SMC and LOFT. This will ensure that all requirements under the EE/CA are met on the LOFT DD&D. Alternative 1 and 2 will not include removal of the non-contaminated embedded lines (conduit, steam, etc.) in the concrete structure of the building. Removal of these types of items increases the safety risk to the worker. Leaving these embedded lines will not invoke the Solid Waste Management Rules for permitted landfill criteria, as the items would be considered part of the concrete structure similar to rebar. The key differences among the alternatives relates to the amount of radioactive contamination that would be left in place. A comparison of each of the alternatives is shown in Table 6, which follows Section 5.4 Evaluation Summary. Removal of the concrete structure to three feet below grade is described in the contractual agreement with DOE. This does not preclude removing more or less of the structure as the particular need arises. What are being described in this EE/CA are non-radioactive non-hazardous concrete outer walls, or concrete walls that have some fixed radioactive contamination that has been included in the bounding scenario for the risk associated with LOFT.

4.1 Alternative 1

The Alternative 1 approach removes above ground components and structures, collapses and removes floors and concrete walls to 3 feet below grade, and removes sump liners, sumps, and piping (including embedded piping). Radiological contamination would be removed. The remaining shell would then be filled to grade with solid inert material (e.g., clean soil, concrete). The specific components of Alternative 1 are as follows:

- TAN-630
 - Remove equipment, ducting, and piping
 - Remove any fixed contamination or contaminated piping
 - Collapse upper floor and remove material
 - Collapse concrete walls to 3 feet below grade and remove
 - Fill shell containing collapsed concrete to grade with solid inert material and contour to surroundings.
 - Install boundary at isolation point between SMC and LOFT.
- TAN-650 Upper and Lower Containment Building
 - Remove above ground structures and components
 - Remove containment building exterior concrete walls to 3 feet below grade
 - Remove containment building welded-steel walls to 3 feet below grade
 - Remove upper containment concrete floor
 - Remove sump liners, sumps, and piping (including embedded piping)
 - Fill to grade with solid inert material and contour to surroundings.
- TAN-650 Miscellaneous (remainder of TAN-650, excludes Upper and Lower Containment Building)
 - Remove equipment, ducting, and piping (including embedded piping)
 - Remove above-ground structures and components
 - Collapse concrete walls to 3 feet below grade and remove
 - Collapse floors
 - Fill shell containing collapsed concrete to grade with solid inert material and contour to surroundings.

4.2 Alternative 2

The Alternative 2 approach removes above ground components and structures, collapses and removes floors and concrete walls to 3 feet below grade for TAN-630 and TAN-650 miscellaneous, fills TAN-630 and TAN-650 miscellaneous to grade with solid inert material. The contaminated sumps, which are in the TAN-650 containment area of LOFT, would be filled with a solid inert material and the piping would be capped. These sumps and embedded pipes are encased in high density, reinforced concrete as far as 30 feet below grade. The LOFT containment building was constructed of high density concrete reinforced with #8 and #11 rebar and with sumps and embedded pipes running throughout the structure. The upper containment floor, which has sumps and embedded lines, is 4 feet 9 inches of high density, reinforced concrete (Figure 3 and Figure 4). The floor thickness and embedded sumps and piping will preclude removing the first 3 feet of upper containment floor. A long-term viable cover (e.g., native soils) will encompass the footprint of the containment dome and the previously filled filter housing room to the east. The annulus voids under this area will be filled with grout providing a stable long-term foundation for the cover. The adjacent areas of TAN-630 and TAN-650 that are demolished to 3 feet below grade will be backfilled with site soils and compacted by processor head and track walking by

equipment as feasible. These areas are not under the "long term viable cover" but will be compacted with proper moisture addition to minimize subsidence and safely support equipment and vehicle traffic for the demolition of the containment dome.

The cover would be constructed over the TAN-650 containment building existing grade level floor slab once above ground equipment (including overhead crane), components (including borated water storage tank), ducting, walls and piping to grade have been removed. The long-term viable cover will be overlain with rock armor to prevent inadvertent intrusion on the cover during the DOE institutional control period, and to provide erosion control during heavy runoff events. Specific components of Alternative 2 are as follows:

- TAN-630
 - Remove equipment, ducting, and piping
 - Remove any fixed contamination or contaminated piping
 - Collapse upper floor and remove
 - Collapse concrete walls to 3 feet below grade
 - Fill shell containing collapsed concrete to grade with solid inert material and contour to surroundings.
 - Install boundary at isolation point between SMC and LOFT.
- TAN-650 Upper and Lower Containment Building
 - Remove containment building exterior concrete walls and exterior welded steel walls to grade
 - Remove above-grade equipment, components, ducting, and piping to grade
 - Cut-off and cap appropriate pipe penetrations through upper containment building floor at top-of-concrete floor slab
 - Fill sumps with solid inert material and cap appropriate pipe penetrations
 - Fill lower containment area with solid inert material
 - Fill annulus with solid inert material
 - Create a long-term viable cover, slope to allow for surface water run-off, cover with several feet of native soils overlain by rock armor sloped accordingly (final engineering design dictates field specifications).
- TAN-650 Miscellaneous (remainder of TAN-650, excludes Upper and Lower Containment Building)
 - Remove equipment, ducting, and piping (except for embedded piping)
 - Remove above-ground structures and components
 - Collapse concrete walls to 3 feet below grade
 - Collapse floors
 - Fill shell containing collapsed concrete to grade with solid inert material and contour to surroundings.

4.3 Alternative 3

Alternative 3 is the no action alternative. The no action alternative provides a baseline against which the impacts of the other alternatives can be compared. Under the no action alternative, removal actions would not be undertaken. Continued surveillance and maintenance of TAN-630 and TAN-650 would remain at the current level of “cold, dark, and dry” through 2095 or until a future D&D is undertaken. A concrete structure (block, pour, etc.) will be installed at the isolation point between SMC and LOFT. This will ensure that all requirements under the EE/CA are met on the LOFT DD&D.

5. ALTERNATIVE ANALYSIS

In accordance with the *Guidance on Conducting Non-Time Critical Removal Actions Under CERCLA* (EPA 1993), each alternative is evaluated with respect to effectiveness, implementability, and cost. Effectiveness is evaluated in terms of overall protectiveness of public health and the environment and ability to achieve non-time-critical removal action objectives. Protectiveness of public health and the environment is evaluated in terms of protection of public health and the community, protection of workers during implementation, protection of the environment, and compliance with applicable or relevant and appropriate requirements (ARARs). (Note: ARARs are also discussed in Section 6.1.) Ability to achieve removal objectives is evaluated in terms of expected level of treatment/containment, no residual effect concerns, and ability to maintain control until implementation of a long-term solution. Implementability of alternatives is evaluated based upon the following: technical feasibility, availability, and administrative feasibility. Technical feasibility is evaluated in terms of construction and operational considerations, demonstrated performance/useful life, adaptability to environmental conditions, contribution to remedial performance, and ability to be implemented in one year. Availability is evaluated in terms of equipment, personnel and services, outside laboratory testing capacity, off-site treatment and disposal capacity, and post-removal site control. Administrative feasibility is evaluated in terms of permits required, easements or right-of-ways required, impact on adjoining property, ability to impose institutional controls, and likelihood of obtaining exemptions from statutory limitations, if needed. The cost of the alternatives is evaluated by looking at capital costs, cost for post-removal control (e.g., continued surveillance and maintenance under Alternative 3), and present worth cost.

On September 30, 2005 Battelle Energy Alliance, LLC (BEA) developed an *Infrastructure Transformation Plan* that contains a time phase list of buildings that are proposed to be excessed over the BEA 10 year contract. This plan also includes the current TAN buildings, including LOFT, that are not owned by DOE-NE. Since inactivation in 1986, DOE has explored several potential missions for the LOFT facility through marketing initiative with SMC and DOE Headquarters Programs, all without success. The *Infrastructure Transformation Plan* concludes that there are no new uses, construction, or modifications planned at TAN.

5.1 Effectiveness of the Alternatives

5.1.1 Protectiveness of Public Health and the Environment

Protectiveness of public health and the environment is evaluated in terms protection of public health and the community, protection of workers during implementation, protection of the environment, and compliance with applicable or relevant and appropriate requirements (ARARs).

Actions associated with Alternative 1, as detailed in Section 4.1, protect public health and the community at the same level of protectiveness currently experienced. Actions associated with Alternative 2, as detailed in Section 4.2, and Alternative 3, as detailed in Section 4.3, are protective of public health and the community as evidenced by the risk assessment results found in Section 2.5. The streamlined risk assessment results indicate that none of the modeled contaminants would produce estimated risks to a future hypothetical receptor greater than $1 \text{ E-}04$, which is the upper bound of the EPA acceptable risk range. Thus all alternatives are protective of public health and the community.

Protection of workers during implementation varies to some degree between each of the alternatives. Workers would be exposed to industrial hazards and hazardous materials during actions associated with implementation of Alternative 1 and Alternative 2. Alternative 1 would expose workers to the highest risk evolutions- as identified by the US Occupational Safety and Health Administration (OSHA). These include:

Excavations: The execution of excavation activities necessary to facilitate this alternative will place employees at an increased risk to cave-in/inundation by soils and other loosely unconsolidated materials associated with this undertaking. The excavation would be greater than 30 feet to completely remove the embedded piping beneath the TAN-650 containment facility (Figure 3). The creation of confined spaces, carbon monoxide/oxygen deficient atmospheres and fall hazards may be reasonably anticipated with excavations of this type. Employees will be at risk to unintentional contact (struck-by, caught between) heavy equipment that would be required to perform this work. OSHA has recently initiated a special focus- compliance initiative which is intended to reduce the significant number of worker fatality incidents associated with excavation and haulage equipment. Additionally, the excavation and handling of excavated materials (cubic yards of soil/material) would be significant due to the requirement to ascertain/maintain an angle of repose (side slope of excavation) to a maximum of 34 degrees from horizontal. This angle of repose for Class C 60 soil requires that a ratio of 1.5 (horizontal) to 1.0 (vertical) is maintained. In addition to the employee safety and health issues (and associated labor costs), there may not be sufficient space to allow for the required excavation configuration.

Demolition: This activity would further expose employees to the risks associated with falling from heights, material handling, haulage, hoisting & rigging, heavy equipment, etc. The use of the hydraulic processor shear and hammer would be reasonably anticipated as a significant “tool” in performing demolition activities associated with this alternative. Several lessons learned have been experienced by ICP crews where near miss scenarios could have easily manifested high consequence employee events.

Workers involved with implementation of Alternative 2 would also be exposed to industrial hazards, but not to the same degree as those workers involved with implementation of Alternative 1. Workers involved with implementation of Alternative 2 would not be required to work in deep excavation areas and thus the risk to those workers would be significantly reduced. Workers would be exposed to industrial hazards associated with implementation of Alternative 3. The industrial hazards would be those associated with the continued surveillance and maintenance of structures that continue to age and degrade through the year 2095. Additionally, there would be the potential for radioactive contaminants to leach from the facility due to periodic flooding of the lower levels of TAN-630 and TAN-650 due to groundwater entering the facility as it currently does.

Each work situation associated with implementation of the alternatives would require a hazards identification and analysis as well as proper mitigation to reduce risks. Ergonomic hazards presented by the handling of equipment and building debris include lifting, reaching, repetitive motion, and the use of hand tools. Cutting and grinding would be required to remove structural steel associated with TAN-630 and TAN-650. Work at high elevations and near excavations would require utilization of fall protection equipment. Scaffolding, ladders, cranes, and man lifts could be used to access high elevation areas. To

minimize industrial hazards, activities associated with implementation of removal actions associated with each alternative would be planned and conducted in compliance with INEEL Standard 101 Integrated Work Control Process, the INEEL Conduct of Operations Manual, and Occupational Safety and Health Administration (OSHA) regulations. In summary, implementation of Alternative 1 would pose the most risk to the worker.

Protection of the environment would be accomplished via implementation of Alternative 1, Alternative 2, and Alternative 3. The streamlined risk assessment results indicate that none of the modeled contaminants would produce estimated risks to a future hypothetical receptor greater than $1 \text{ E-}04$, which is the upper bound of the EPA acceptable risk range. Thus all alternatives would be protective of the environment in the long-term. However, as the facility continues to age and degrade as is the case during implementation of Alternative 3, there would be the potential for radioactive contaminants to leach from the facility due to periodic flooding of the lower levels of TAN-630 and TAN-650.

Radiation exposure would be limited by administrative and engineering controls. Exposures would be managed in accordance with as low as reasonably achievable (ALARA) principals, which strives to minimize occupational radiation exposure to workers. 10 CFR 853.202(a)(1) states that a worker shall not exceed an occupational total effective dose equivalent of 5 rem/yr. The administrative control level would be evaluated annually by the Radiological Control Director and any changes would be approved by the Site Contractor Senior Executive. No individual would be allowed to exceed the administrative control level without the prior written approval of the Radiological Control organization, knowledgeable facility manager, and the Radiological Control Director. Site administrative control levels would be maintained well below the federal limit. Activities would be performed following established safety procedures. Safety analysis documentation and radiation work permits would be prepared before work begins. Activities would be monitored by trained radiological control technicians, industrial hygienists, and industrial safety technicians and/or engineers. Worker doses would be monitored by dosimeters, and the dose to a worker would not be allowed to exceed the applicable regulatory and administrative limits. Limiting work times in the areas and employing engineering controls would minimize occupational doses. Doses to individual workers would be maintained within established ALARA goals. In summary, implementation of Alternative 2 would provide the best avenue with which to achieve compliance with ARARs as radiologically contaminated piping and sumps would not be directly disturbed by the worker.

Compliance with applicable or relevant and appropriate requirements (ARARs) would be accomplished for each alternative, although the difficulty of achieving compliance varies between alternatives. There is radioactive contamination in sumps and embedded piping of the TAN-650 miscellaneous structures and the TAN-650 containment building as well as the interior of the TAN-650 upper containment building that would be encountered during removal activities. Radiation exposure would be a possibility during implementation of any of the alternatives, but the risk of radiation exposure would be increased during implementation of Alternative 1 as the worker would be in contact with contaminated structures and components as this contact would be necessitated in order to implement Alternative 1. Potential radiation exposures resulting from implementation of Alternative 3, the no action alternative, could reasonably be expected to increase as TAN-630 and TAN-650 continue to age and degrade. Implementation of Alternative 2 would provide the best avenue with which to achieve compliance with ARARs as radiologically contaminated piping and sumps would not be directly disturbed by the worker and thus the potential for radiation exposure would be reduced when compared to either Alternative 1 or Alternative 3.

5.1.2 Ability to Achieve Non-Time-Critical Removal Action Objectives

Ability to achieve removal objectives is evaluated in terms of expected level of treatment/containment, no residual effect concerns, and ability to maintain control until implementation of a long-term solution. Under the Alternative 1 scenario, the entirety of TAN-630 and TAN-650 would be removed and disposed of in the TAN Demolition Landfill, the ICDF Landfill, other INL site landfill, or an appropriate non-INL disposal facility. Implementation of Alternative 1 would require no treatment of waste while providing long-term containment within an approved landfill. There would be no residual effect concerns regarding waste management and disposal and control would be maintained without the need to seek an alternative long-term solution. Implementation of Alternative 2 would also require no treatment of waste while providing long-term containment within the existing LOFT area footprint itself. Limited landfill capacity would remain intact and would therefore be available for future INL site waste, as appropriate. Implementation of Alternative 2 would also result in no residual effect concerns. Once the protective cover is constructed as required by Alternative 2, the previously active LOFT area would remain undisturbed for perpetuity, continued surveillance and monitoring would be unnecessary, and control would be maintained without the need to seek an alternative long-term solution. Implementation of Alternative 3 would consist entirely of continued surveillance and maintenance. The expected level of containment would diminish as TAN-630 and TAN-650 continue to age and degrade. With the possibility of the lower levels of the TAN-650 facility periodically flooding due to groundwater entering an aging facility, there could be residual effect concerns. Moreover, the ability to maintain control until implementation of a long-term solution would also diminish as TAN-630 and TAN-650 continue to age and degrade.

5.2 Implementability of the Alternatives

Implementability of alternatives is evaluated based upon the following: technical feasibility, availability, and administrative feasibility. Technical feasibility is evaluated in terms of construction and operational considerations, demonstrated performance/useful life, adaptability to environmental conditions, contribution to remedial performance, and ability to be implemented in one year. Availability is evaluated in terms of equipment, personnel and services, outside laboratory testing capacity, off-site treatment and disposal capacity, and post-removal site control. Administrative feasibility is evaluated in terms of permits required, easements or right-of-ways required, impact on adjoining property, ability to impose institutional controls, and likelihood of obtaining exemptions from statutory limitations, if needed.

5.2.1 Technical Feasibility

Alternative 1 would require an intensive demolition effort to remove interior structures and an even greater effort to remove the concrete foundations associated with TAN-650 in order to remove the embedded piping, sumps, and concrete. Excavations would need to be greater than 30 feet deep through high density reinforced concrete to remove embedded pipes and sumps (Figure 3), with the excavation being 1.5 times as wide as it is deep in order to meet OSHA requirements for excavations. Under this alternative, radiologically contaminated piping and sumps, non-radiologically contaminated piping and sumps, conduit, concrete and rebar, and miscellaneous demolition debris would be removed and disposed at ICDF or the TAN Demolition landfill. Remediation would not be a removal action objective under the Alternative 1 scenario. It is anticipated that implementation of Alternative 1 would take greater than one year. Implementation of Alternative 1 would be technically feasible, but at an increased cost in terms of time, materials, transportation, exposure to industrial hazards, and services.

Alternative 2 would use a less intensive construction and operational approach to achieve the removal action objectives. The alternative would reduce risk from external radiation exposure to Cs-137 to a total excess cancer risk of less than 1 in 10,000 for a hypothetical resident 100 years in the future from the year 1995 and the current and future worker. The risk assessment results indicate that none of the modeled contaminants would produce estimated risks to a future hypothetical residential receptor greater than 1E-04 (i.e., the upper bound of the EPA acceptable risk range). Remediation would not be a removal action objective under the Alternative 2 scenario. It is anticipated that implementation of Alternative 2 would take less time than implementation of Alternative 1, but it would also take greater than one year. Implementation of Alternative 2 would be technically feasible and at less cost in terms of time, materials, transportation, exposure to industrial hazards, and services than would be Alternative 1.

Alternative 3, the no action alternative, would require minimal immediate expenditure of time, resources, engineering, or development. Continued surveillance, maintenance, and monitoring would require an expenditure of resources through the year 2095. The primary deterrent to the implementation of this alternative would be the potential radiation exposure of workers and the environment and the hazards of entering an aging facility as TAN-630 and TAN-650 continue to age and deteriorate. Therefore, although implementation of Alternative 3 would be technically feasible, a potential threat to worker health and the environment would remain.

5.2.2 Availability

Availability of equipment, personnel and services, outside laboratory testing capacity, off-site treatment and disposal capacity, and post-removal site control would not impose any limitations on any of the three alternatives. In short, the resources required to implement each of the alternatives would be available.

5.2.3 Administrative Feasibility

Administrative feasibility is evaluated in terms of permits required, easements or right-of-ways required, impact on adjoining property, ability to impose institutional controls, and likelihood of obtaining exemptions from statutory limitations, if needed. There would be no permit requirements, easement or right-of-ways requirements, or exemptions from statutory limitations associated with any of the three alternatives. Alternative 1 would impact the adjoining property due to power and fire water outages associated with the intensive demolition effort required to completely remove all structures and components associated with TAN-630 and TAN-650. Alternative 2 would require minimal power and fire water outages, if at all. Alternative 3 would not impact the adjoining property in the near-term, but as the facility continues to age and degrade the impact to adjoining property would increase.

5.3 Cost of the Alternatives

The cost of the alternatives takes into consideration capital outlay, continued surveillance and maintenance, and resource allocation. The cost estimates associated with each alternative are summarized and shown in Table 5. These costs have taken into consideration direct capital costs, indirect capital costs, and annual post-removal site control costs.

Table 5. Cost Estimates for Alternatives.

Cost Description	Alternative 1	Alternative 2	Alternative 3
Decommissioning Planning	\$7,809,206	\$5,623,709	Not Applicable
Containment Building Decommissioning	\$12,846,565	\$8,137,951	Not Applicable
TAN-650 Decommissioning	\$7,057,130	\$6,202,285	Not Applicable
TAN-630 Decommissioning	\$2,207,544	\$1,754,957	Not Applicable
Continued Surveillance and Monitoring Until 2095 (Quarterly)	Not Applicable	Not Applicable	\$504,000
TOTAL	\$29,920,445	\$21,718,902	\$504,000

The above cited cost estimates are based upon performing the work associated with the proposed actions over the next two calendar years. Cost associated with Alternative 1 and Alternative 2 is relatively straightforward. The cost to implement Alternative 1 is greater than Alternative 2 by over 8 million dollars. The cost estimate cited for Alternative 3, the no action alternative, only addresses the cost associated with quarterly surveillance, monitoring, and maintenance through 2095. The cost to maintain TAN-630 and TAN-650 in a condition that is protective of worker health and the environment is difficult to predict due to the uncertainties associated with aging and degrading structures. Thus, the estimated cost for continued surveillance, monitoring, and maintenance only represents a minimum amount.

5.4 Evaluation Summary

Table 6 provides a comparison of the various actions associated with each alternative. Alternative 1 would meet the effectiveness criteria, yet implementation of Alternative 1 would expose workers to higher occupational risks and an increased potential for radiological exposure. Alternative 2 would meet the effectiveness criteria, yet implementation of Alternative 2 would pose less occupational risk and lower radiological exposure to the worker than Alternative 1. Alternative 3 would meet the effectiveness criteria at the same level being experienced today, but as TAN-630 and TAN-650 continue to age and degrade this level of effectiveness would diminish. With the possibility of the lower levels of the TAN-650 facility periodically flooding due to groundwater entering an aging facility, there could be an impact to the environment through contamination. In addition, continuing degradation of the facility results in an increased and unacceptable risk to personnel required to enter the facility to perform any maintenance and surveillance activities. Actions associated with Alternative 1 shift protectiveness criteria from one locale, TAN-630 and TAN-650, to that of the ultimate disposal locations (i.e. TAN Demolition Landfill, ICDF Landfill, other INL site facility, or non-INL disposal facility). Alternative 2 would meet the protectiveness criteria over the long term as shown by the risk assessment provided in Section 2.5. Alternative 2 would produce less risk to workers and the public during transfer of waste to a designated disposal site. Exposures resulting from the actions associated with Alternative 1 and Alternative 2 would be managed in accordance with “as low as reasonably achievable” (ALARA) principals. Potential exposures resulting from implementation of Alternative 3, the no action alternative, could reasonably be expected to increase as TAN-630 and TAN-650 continue to age and degrade.

Implementation of Alternative 1 would be both technically and administratively feasible, but at an increased cost in terms of time, materials, exposure to industrial hazards, and services required to achieve successful implementation of the proposed actions. The LOFT containment building was constructed of high density concrete reinforced with #8 and #11 rebar and with sumps and embedded pipes running throughout the structure. The upper containment floor is 4 feet 9 inches in thickness. The difficulty and hazard to the worker from a complete removal through Alternative 1 would produce minimal gain for the

low risk from radioactive contamination in the facility, since DOE will maintain control of the INL until 2095. Alternative 2 reduces risk from external radiation exposure from Cs-137 to a total excess cancer risk of less than 1 in 10,000 for a hypothetical resident 100 years in the future from the year 1995 and the current and future worker. Yet, Alternative 2 would produce less risk to the worker due to less fall hazards, less confined space entries for demolition, less exposure through removal of radioactive embedded pipes and sumps, and less windborne radioactive fugitive emissions. The primary deterrent to the implementation of Alternative 3 would be the potential radiation exposure as well as the health and safety concerns of surveillance and maintenance personnel required to enter TAN-630 and TAN-650 as the facilities continue to age and deteriorate.

A comparison of the costs associated with each alternative as evidenced in Table 5 shows that Alternative 3 initially appears to have the least cost associated with the no-action alternative, yet the unknowns associated with a structure that continues to age and deteriorate cannot be calculated with absolute certainty. Alternative 1 would be the most costly to implement. The long-term viable cover associated with Alternative 2 would be protective of the environment, meet the evaluation criteria, and would be significantly less costly than that of Alternative 1.

An evaluation of the alternatives in terms of effectiveness, implementability, and cost shows that Alternative 2 would be the preferred action alternative. Implementation of Alternative 2 would ensure compliance with environmental regulations, including those that are applicable or relevant and appropriate requirements, as evidenced in Section 6.1. Moreover, implementation of Alternative 2 would ensure that removal action objectives would be achieved without exposing the worker to additional risk.

Table 6. Comparison of Alternatives.

End State	Alternative 1 Remove Radioactive Contamination			Alternative 2 Radioactive Contamination Remaining in Four Sumps and Associated Lines			Alternative 3 No Action
	TAN-630	TAN-650 Containment Structure	TAN-650 Miscellaneous	TAN-630	TAN-650 ^a Containment Structure	TAN-650 ^a Miscellaneous	No Action
Remove Above Ground Structures and Components	Yes	Yes	Yes	Yes	Yes	Yes	
Remove Equipment, Ducting, and Piping	Yes	Yes	Yes	Yes	Yes	Yes	
Remove Embedded Piping	N/A	Yes	Yes	N/A	No	No	
Remove Embedded Conduit	No	No, Unless Contaminated	No, Unless Contaminated	No	No	No	
Collapse and Remove Ground-Level Floor	Yes	Yes	Yes	Yes	No	Yes	
Collapse Walls to 3 Feet Below Grade	Yes	Yes	Yes	Yes	No – Containment Structure Exterior Concrete Walls/ Steel Walls removed to Grade	Yes	
Remove Sump Liners, Sumps, and/or Piping	Yes	Yes	Yes	No	No	No	
Cut-Off Pipe Penetrations Through Upper Containment Structure Floor at Top-of-Concrete Floor Slab	N/A	N/A	N/A	N/A	Yes	N/A	
Fill to Grade with Solid Inert Material	Yes	Yes	Yes	Yes	Yes	Yes	
Pour Lean Fill in Sumps & Cap Penetrations	N/A	No	N/A	N/A	Yes	N/A	
Fill Annulus and Lower Containment Area with Solid Inert Material	N/A	N/A	N/A	N/A	Yes	N/A	
Build Long-Term Viable Cover	No	No	No	No	Yes	No	
Cover with Native Soil and Rock Armor	No	No	No	No	Yes	No	
Install boundary at isolation point between SMC and LOFT	Yes	N/A	N/A	Yes	N/A	N/A	Yes

a. See Tables 1 and 2 for total Curies of radioactive contamination in 2005 and 2095.

6. RECOMMENDED ALTERNATIVE

6.1 Compliance with Environmental Regulations, Including Those That Are Applicable or Relevant and Appropriate Requirements

6.1.1 CERCLA

Section 121 of CERCLA (42 USC § 9621) requires the responsible CERCLA implementing agency to ensure that the substantive standards of HWMA/RCRA and other applicable laws will be incorporated into the federal agency's design and operation of its long-term remedial actions and into its more immediate removal actions. The DOE-ID is the implementing agency for this non-time-critical removal action. The EPA and DEQ will review the EE/CA and concur if appropriate in the Action Memorandum. Through the non-time-critical removal action process, the risks presented in this document will be mitigated in a timely manner.

Alternative 2 is the preferred alternative because of its effectiveness, implementability, and cost. Alternative 3 initially appears to have the least cost associated with the no-action alternative, yet the unknowns associated with implementation of this alternative cannot be calculated with any degree of certainty and thus compliance with environment regulations can also not be determined with any degree of certainty. Compliance with environment regulations can be achieved through implementation of Alternative 1, yet Alternative 1 is the most costly and poses the most risk to the worker due to the intensive nature of the work required in Alternative 1. Alternative 2 clearly achieves the removal action goals in a timely and cost effective manner. Implementation of Alternative 2 will ensure compliance with environmental regulations, including those that are applicable or relevant and appropriate requirements.

Implementation of Alternative 2 will result in the generation and subsequent management of radioactive and non-radioactive wastes. Table 7 lists the proposed ARARs that have been identified for this alternative. These ARARs are a compilation and expansion of the ARARs identified in the OU 1-10 Record of Decision (DOE-ID 1999). The ARARs list is based on several key assumptions:

- Any residual contamination left in-place will meet the Remedial Action Objectives (RAOs) established in the OU 1-10 ROD and associated ROD Amendments and Explanation of Significant Differences (ESDs).
- Management of CERCLA waste generated during the removal action will be subject to meeting the waste acceptance criteria of the ICDF Landfill and TAN Demolition Landfill.
- If decontamination liquids are generated, they will be disposed at the ICDF Evaporation Ponds in accordance with the facility waste acceptance criteria.
- Asbestos-containing material may be encountered incidental to performance of the NTCRA. This waste will be subject to specific asbestos regulations and will be acceptable for disposal at the ICDF and/or, if not radiologically contaminated, at the TAN Demolition Landfill. Friable asbestos will be removed and disposed as required by NESHAPs.

Table 7. Summary of Applicable or Relevant and Appropriate Requirements for LOFT TAN-630 and TAN-650, Non-Time Critical Removal Action.

Requirement (Citation)	ARAR Type	Comments
Clean Air Act and Idaho Air Regulations		
"Toxic Substances," IDAPA 58.01.01.161	A	Applies to any toxic substances emitting during implementation of the removal action.
<10 mrem/yr, 40 CFR 61.92, "Standard"	A	Applies to the waste-handling activities.
"Emission Monitoring and Test Procedures," 40 CFR 61.93	A	Applies to the waste-handling activities.
"Compliance and Reporting," 40 CFR 61.94(a)	A	Applies to the waste-handling activities.
"Standards for Demolition and Renovation," 40 CFR 61.145	A	Applies to any asbestos-containing materials removed during the decommissioning.
"Rules for Control of Fugitive Dust," and "General Rules," IDAPA 58.01.01.650 and .651	A	Applies to the waste-handling activities.
RCRA and Idaho Hazardous Waste Management Act		
"Standards Applicable to Generators of Hazardous Waste," IDAPA 58.01.05.006, and the following, as cited in it:		
"Hazardous Waste Determination," 40 CFR 262.11	A	Applies to waste that would be generated during the removal action.
NRC Compliance		
10 CFR 61	R	Waste classification that sets Cs-137 criterion of 1 Ci/m ³ for Class A shallow disposal
<i>General Facility Standards:</i>		
IDAPA 58.01.05.008, "Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities," and the following, as cited in it:		
"Temporary Units (TU)," 40 CFR 264.553	A	Waste may be treated or temporarily stored in a temporary unit prior to disposal.
"Staging Piles," 40 CFR 264.554	A	Waste may be temporarily staged prior to disposal.
"General Inspections Requirements," 40 CFR 264.15	A	Applies to a facility staging, storing, or treating hazardous waste prior to transfer to the ICDF or an off-Site facility.
"Preparedness and Prevention," 40 CFR 264, Subpart C	A	Applies to a facility staging, storing, or treating hazardous waste prior to transfer to the ICDF or an off-Site facility.
"Contingency Plan and Emergency Procedures," 40 CFR 264, Subpart D	A	Applies to a facility staging, storing, or treating hazardous waste prior to transfer to the ICDF or an off-Site facility.
"Disposal or Decontamination of Equipment, Structures, and Soils," 40 CFR 264.114	A	Applies to contaminated equipment used to remove, treat, or transport hazardous waste.

Table 7. (continued).

Requirement (Citation)	ARAR Type	Comments
"Use and Management of Containers," 40 CFR 264.171–178	A	Applies to containers used during the removal and treatment of hazardous waste.
Land Disposal Restrictions		
IDAPA 58.01.05.011, "Land Disposal Restrictions," and the following, as cited in it:		
"Applicability of Treatment Standards," 40 CFR 268.40(a)(b)(e)	A	Applies to hazardous waste and secondary waste, if treatment is necessary to meet the disposal facility's waste acceptance criteria or if treatment is required before placement.
"Treatment Standards for Hazardous Debris," 40 CFR 268.45	A	Applies to hazardous debris, if treatment is necessary to meet the disposal facility's waste acceptance criteria or if treatment is required before placement.
"Universal Treatment Standards," 40 CFR 268.48(a)	A	Applies to non-debris hazardous waste and secondary waste, if treatment is necessary to meet the disposal facility's waste acceptance criteria or if treatment is required before placement.
"Alternative LDR Treatment Standards for Contaminated Soil," 40 CFR 268.49	A	Applies to contaminated soil, if treatment is necessary to meet the disposal facility's waste acceptance criteria or if treatment is required before placement.
Idaho Groundwater Quality Rules		
"Ground Water Quality Rule," IDAPA 58.01.011	A	The waste-handling activities must prevent migration of contaminants from the reactor complexes that would cause the Snake River Plain Aquifer groundwater to exceed applicable State of Idaho groundwater quality standards in 2095 and beyond.
TSCA		
"Decontamination Standards and Procedures: Decontamination Standards," 40 CFR 761.79(b)(1)	A	Applicable to decontamination of equipment with PCB contamination, if PCB waste is generated.
"Decontamination Standards and Procedures: Self-Implementing Decontamination Procedures," 40 CFR 761.79(c)(1) and (2)	A	Applicable to decontamination of equipment with PCB contamination, if PCB waste is generated.
"Bulk Product Disposition," 40 CFR 761.62(b)	A	Applicable to disposition of waste in a NMSWLF with concentrations of PCBs greater than 50 ppm.
"Decontamination Standards and Procedures: Decontamination Solvents," 40 CFR 761.79(d)	A	Applicable to decontamination of equipment used to manage PCB-contaminated waste, if PCB waste is generated.
"Decontamination Standards and Procedures: Limitation of Exposure and Control of Releases," 40 CFR 761.79(e)	A	Applicable to decontamination activities of equipment with PCB-contaminated waste, if decontamination is performed.

Table 7. (continued).

Requirement (Citation)	ARAR Type	Comments
“Decontamination Standards and Procedures: Decontamination Waste and Residues,” 40 CFR 761.79(g)	A	Applicable to management of decontaminated waste and residuals from PCB-contaminated equipment, if PCB waste is generated.
Solid Waste Management Rules		
IDAPA 58.01.06.012, Solid Waste Management Rules for Tier II Landfills	A	Applicable to operation and management of TAN Demolition Landfill, and if determined appropriate, residual solid waste resulting from selected alternative.
To-be-Considered Requirements		
“Radiation Protection of the Public and the Environment,” DOE Order 5400.5, Chapter II(1)(a,b)	TBC	Applies. Substantive design and construction requirements would be met to keep public exposures as low as reasonably achievable.
“Region 10 Final Policy on the Use of Institutional Controls at Federal Facilities,” May 3, 1999 (EPA 1999)	TBC	Applies to residual waste following completion of the removal action.
A = applicable requirement; R = relevant and appropriate requirement ARAR = applicable or relevant and appropriate requirement CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act CFR = Code of Federal Regulations DOE = U.S. Department of Energy EPA = U.S. Environmental Protection Agency ICDF = INEEL CERCLA Disposal Facility IDAPA = Idaho Administrative Procedures Act NMSWLF= Non-Municipal Solid Waste Landfill PCB = polychlorinated biphenyl RCRA = Resource Conservation and Recovery Act TBC = to be considered TSCA = Toxic Substances Control Act		

6.1.2 Voluntary Consent Order

VCO actions have been implemented to ensure compliance with environmental regulations. These VCO actions are summarized as follows:

- Eighteen tank systems comprising 79 tanks located in TAN-630 and TAN-650 at the LOFT area were identified as covered matters in the SITE-TANK-005 Action Plan of the Voluntary Consent Order (VCO). RCRA actions have been completed for these tanks and they have been moved to Appendix C of the VCO as a closed matter. This includes the RCRA closure of VCO System TAN-020 and HTRE-III Mercury Contaminated Sumps (4 tanks), which was completed in 2005 and described in Section 2.2.2 above.
- The other 17 tank systems (75 tanks) were characterized as RCRA non-hazardous or empty. Included in this group is VCO System TAN-010 TAN/CTF (LOFT) Boiler Fuel Oil System, which the DEQ agreed to move to Appendix C of the VCO as a closed matter provided that the system is closed under 40 CFR Part 280 UST requirements. This closure action is presently underway and should be completed prior to the end of this calendar year.

Non-VCO RCRA actions have been implemented to ensure compliance with environmental regulations. These non-VCO actions are summarized as follows:

- In 1994 and 1995, potential hazardous materials such as lead, mercury switches, and silver solder were removed from TAN-630 and TAN-650.
- In 1996, the TAN-726 Chromate Water Storage Unit and TAN-726A Chromate Treatment Unit (2 tanks total) were RCRA closed. The two tanks were removed in September 2005.
- During 2004 and 2005, major system components at TAN-630 AND TAN-650 were either removed or decontaminated. RCRA regulated components (e.g., silver and lead found in the contact points of high voltage breakers, lead contaminated brass and bronze in the form of sprinkler heads and valves) in TAN-630 and TAN-650 were removed and managed in accordance with federal, state, and local regulations. During that timeframe, asbestos abatement was also performed in both TAN-630 and TAN-650.

6.1.3 Cultural Resources

Section 106 of the National Historic Preservation Act of 1966 (NHPA), as amended, requires agencies to consider the impact of undertakings on properties listed or eligible for listing in the National Register of Historic Places, and to consult with the Idaho State Historic Preservation Officer (SHPO) and other interested parties when impacts are likely. It also requires federal agencies to invite the Advisory Council on Historic Preservation (ACHP) to participate in consultation when impacts may be adverse. The Section 106 process has been tailored to meet the unique needs of the INL site and is described in the INL Cultural Resources Management Plan (CRMP). Section 110 of the NHPA directs federal agencies to establish programs to find, evaluate, and nominate eligible properties to the National Register of Historic Places, including previously unidentified historic properties that may be discovered during the implementation of a project (36 CFR 800). In addition, the Archaeological Resources Protection Act of 1979, as amended, provides for the protection and management of archaeological resources on federal lands. The INL CRMP is implemented through a Programmatic Agreement between the DOE Idaho Operations Office (DOE-ID), the Idaho SHPO and the ACHP.

Both TAN-630 and TAN-650 are historic properties, eligible for nomination to the National Register of Historic Places. TAN-630 and TAN-650 have been designated as Signature Properties by DOE HQ. LOFT was the only nuclear reactor test facility in the world designed to simulate, as closely as possible, the important events that could occur during loss-of-coolant accidents and other accidents (transients) in commercial pressurized water reactor power plants. The experiments conducted at LOFT provided measurements of actual physical events to be compared with calculations of the analytical computer codes that predict reactor response to such accidents. Experimental data was then used to evaluate and improve predictive codes which the Nuclear Regulatory Commission used in licensing conditions for nuclear power plants. The information also aided the Nuclear Regulatory Commission in making regulatory decisions and was used in developing personnel with the skills and knowledge to assess reactor behavior, apply computer codes, and interpret the results. TAN-630 and TAN-650 are eligible to the National Register of Historic Places through their association with the LOFT program and for their design and workmanship.

The DOE Idaho Operations Office has made the decision to proceed with demolition of the TAN 630 and TAN-650 properties. To mitigate the adverse impacts caused by such action, the DOE Idaho Operations Office, through formal consultation with the Idaho SHPO, has developed a Memorandum of Agreement that outlines measures to preserve the LOFT history, as well as, commitments to edit and republish a public history book on the INL, publish and distribute historical reports that are written for inclusion in the Library of Congress collections, endow a university scholarship for students pursuing a degree in a preservation-related discipline, and to preserve technical reports, engineering drawings, historic photographs, and other important documents in an INL archive via the support of a professional archivist. The DOE-ID invited the Advisory Council to participate in consultation and to be a signature to the MOA. However, the Advisory Council declined to participate. The MOA was signed by DOE-ID and the Idaho SHPO in October 2005 and outlines a schedule for completion of each stipulated mitigation measure.

DOE is required to review as guidance the most current United States Fish and Wildlife Service list for threatened and endangered plant and animal species. DOE-ID determined that none of the alternatives would impact any threatened and endangered species and also determined that formal consultation with the United States Fish and Wildlife Service is not required for this action.

6.2 Compliance with Non-INL Disposal Facility Waste Acceptance Criteria

Waste disposal facilities are available at the INL site to accommodate the waste generated during removal actions. It is anticipated that waste generated during decommissioning activities associated with implementation of the selected alternative will meet the waste acceptance criteria for either the TAN Demolition Landfill or ICDF Landfill. Any waste generated that does not meet the waste acceptance criteria of these INL site facilities will be staged and stored for disposal at an off-site facility, subject to meeting its waste acceptance criteria.

6.3 TAN Demolition Landfill Waste Acceptance Criteria

Construction and demolition debris with painted or treated surfaces, may be accepted at the TAN Demolition Landfill so long as the debris does not qualify as a hazardous waste pursuant to the Resource Conservation and Recovery Act and does comply with the state and federal disposal requirements for PCBs as identified in the Toxic Substance Control Act. The following types of nonhazardous and nonradioactive construction and demolition waste may be taken to the TAN Demolition Landfill for disposal: asphalt; concrete; masonry block; brick; flooring material; gypsum board; scrap metal; steel roofing; steel siding; insulated siding; gravel; rock; building lumber; wiring; soil; inert waste; and nonfriable asbestos-containing material.

6.4 INEEL CERCLA Disposal Facility Waste Acceptance Criteria

The INEEL National Engineering and Environmental Laboratory (INEEL) Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Disposal Facility (ICDF) landfill will accept only low-level, mixed low-level, hazardous, and Toxic Substances Control Act (TSCA) waste generated from INL site CERCLA activities for disposal. The ICDF is one option for disposal of the radioactively contaminated decommissioning waste. Decommissioning waste not requiring treatment to meet land disposal restriction requirements can be sent to the ICDF Landfill, if it meets the waste acceptance requirements as outlined in “Waste Acceptance Criteria for ICDF Landfill (DOE/ID-10865). Based on data currently available on the waste that will be generated from the TAN-630 and TAN-650 decommissioning process, it is not expected that treatment will be required to meet the land disposal restrictions for the ICDF. Waste which will be considered for disposal at the ICDF include such items as the containment dome, the polar crane, the borated water tank, various amounts of ducting, and other pieces of equipment that might be radioactively contaminated and does not meet the criteria for the TAN Demolition landfill.

6.5 Achieving Removal Action Goals

The removal action goal for this non-time critical removal action is as follows: Reduce risk from external radiation exposure from Cs-137 to a total excess cancer risk of less than 1 in 10,000 for a hypothetical resident 100 years in the future from the year 1995 and the current and future worker. In addition, general CERCLA protectiveness standards at the INL site seek to prevent future releases to the Snake River Plain Aquifer that would result in migration of contaminants to the aquifer such that drinking water maximum contaminant levels may be exceeded and to ensure cumulative excess cancer risks from multiple contaminants of concern remain less than 1 in 10,000 for a hypothetical resident 100 years in the future from the year 1995. These removal action goals are consistent with the remedial action objectives of the *Final Record of Decision, Test Area North, Operable Unit 1-10* (DOE/ID-10682) (ROD) and the overall remediation goals established in the Federal Facilities Agreement and Consent Order for WAG 1. The removal action goals are predicated on the current and future land uses established for the TAN area in the ROD, which includes industrial land use until at least 2095 and possible residential land use thereafter.

An evaluation of Alternative 2 in terms of effectiveness, implementability, and cost shows that Alternative 2 is the recommended alternative and also Alternative 2 clearly achieves the removal action goals in a timely and cost effective manner. Implementation of Alternative 2 will ensure compliance with environmental regulations, including those that are applicable or relevant and appropriate requirements.

7 REFERENCES

1995 Spent Nuclear Fuel & Idaho National Engineering Laboratory Final Environmental Impact Statement

Burns, D. 2005, Streamlined Risk Assessment. November 11, 2005.

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DOE-ID, 2003, Composite Analysis for the INEEL CERCLA Disposal Facility Landfill, DOE/ID-10979, Rev. 0, U.S. Department of Energy Idaho Operations Office, August 2003.

EDF-6355, LOFT Characterization Study, December 5, 2005.

EPA Policy on Decommissioning of Department of Energy Facilities Under the Comprehensive Environmental Response, Compensation, and Liability Act (DOE and EPA 1995)

Final Record of Decision, Test Area North, Operable Unit 1-10 (DOE/ID-10682) (ROD)

Guidance on Conducting Non-Time Critical Removal Actions Under CERCLA (EPA 1993)

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